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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/774,952	02/09/2004	Qing Ma	884.804US2	8635
21186 7590 01/10/2008 SCHWEGMAN, LUNDBERG & WOESSNER, P.A. P.O. BOX 2938 MINNEAPOLIS, MN 55402			EXAMINER DIAZ, JOSE R	
			ART UNIT 2815	PAPER NUMBER
			MAIL DATE 01/10/2008	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

TH

Office Action Summary	Application No.	Applicant(s)	
	10/774,952	MA ET AL.	
	Examiner	Art Unit	
	José R. Díaz	2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 October 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,4,8-12,23-26 and 30-37 is/are pending in the application.
- 4a) Of the above claim(s) 8-10,23-26 and 30-33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,4,11,12 and 34-37 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>10/22/07</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on October 22, 2007 has been entered.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on October 22, 2007 was considered by the examiner.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 11-12 are rejected under 35 U.S.C. 102(e) as being anticipated by Wachtler et al. (US Pat. No. 6,274,391 B1).

Regarding claim 11, Wachtler et al. teaches a microelectronic package, comprising:

a heat spreader (12) [please note that substrate 12 can be considered as a heat spreader because: a) it is made of metal, and b) it can be formed with heat slugs to facilitate heat dissipation. See col. 8, lines 40-41 and 45-46] having a first surface (top surface), said heat spreader having at least one recess (14) defined therein by at least one sidewall extending from said heat spreader first surface to a recess bottom surface [see fig. 21];

at least one microelectronic die (16) disposed within said at least one recess (14), said at least one microelectronic die having an active surface (top surface), a back surface, and at least one side [see fig. 21]; and

build-up layers (24, 26, 32, 36, 34) disposed on said microelectronic die active surface and said heat spreader first surface [see fig. 21]; wherein said build-up layers comprise at least one dielectric layer (24,26) abutting said at least one microelectronic die active surface (top surface of die 16) and said heat spreader first surface (top surface of heat spreader 12) [see fig. 21] and at least one conductive trace (32, 34) disposed on said at least one dielectric layer [see figs. 14 and 21 and col. 9, lines 33-39].

Regarding claim 12, Wachtler et al. further teaches that said at least one dielectric layer (24) is disposed within gaps between said at least one recess sidewall and said at least one microelectronic die side [consider the space formed between die 16 and substrate 12, which is filled with layer 24. See fig. 21 and col. 9, lines 1-3].

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 1, 3-4 and 34-35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wachtler et al. (US Pat. No. 6,274,391 B1) in view of Watson et al. (US 5,168,926).

Regarding claim 1, Wachtler et al. teaches a microelectronic package, comprising:

a heat spreader (12) [please note that substrate 12 can be considered as a heat spreader because: a) it is made of metal, and b) it can be formed with heat slugs to facilitate heat dissipation. See col. 8, lines 40-41 and 45-46] having a first surface, said heat spreader having at least one recess (14) defined therein by at least one sidewall extending from said heat spreader first surface to a recess bottom surface [see fig. 21];

at least one microelectronic die (16) disposed within said at least one recess (14), said at least one microelectronic die having an active surface (top surface), a back surface, and at least one side [see fig. 21];

a thermally conductive material (adhesive) to secure the die (16) within cavity (14) [see col. 8, lines 55-57]; and

build-up layers (24, 32, 34) disposed on said microelectronic die active surface and said heat spreader first surface [see fig. 21].

However, Wachtler et al. fails to show a thermally conductive material adhering said at least one microelectronic die back surface to said recess bottom surface.

Watson et al. teaches a die (28) secured within recess (24) of heat sink (10) by a thermally conductive material (26) [see figs. 1 and 4 and col. col. 2, lines 65-67].

With regards to claims 34-35, Watson et al. teaches a thermally conductive epoxy that is deformable in the uncured state (26). [see col. 2, lines 65-67]. With regards to the resin limitation recited in claim 34, one of ordinary skill in the art recognizes that all epoxies are resin products, hence it is inherent that the thermally conductive epoxy in Watson et al. is also a resin.

Wachtler et al. and Watson et al. are analogous art because they are from the same field of endeavor as applicant's invention. At the time of the invention it would have been obvious to a person of ordinary skill in the art to show a thermally conductive material between the microelectronic die back surface and the recess bottom surface of the device taught by Wachtler et al. The motivation for doing so, as is taught by Watson et al., is to minimize the conductive path between the integrated circuit and the heat spreader (col. 1, lines 19-21). Therefore, it would have been obvious to combine Watson et al. with Wachtler et al. to obtain the invention of claims 1, 3-4 and 34-35.

Regarding claim 3, Wachtler et al. further teaches that said build-up layers comprise at least one dielectric layer (24) abutting said at least one microelectronic die active surface and said heat spreader first surface and at least one conductive trace (32, 34) disposed on said at least one dielectric layer [see fig. 21].

Regarding claim 4, Wachtler et al. further teaches that said at least one dielectric layer (24) is disposed within gaps between said at least one recess sidewall and said at least one microelectronic die side [consider the space formed between die 16 and substrate 12, which is filled with layer 24. See fig. 21 and col. 9, lines 1-3].

7. Claims 36-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wachtler et al. (US Pat. No. 6,274,391 B1) in view of Watson et al. (US 5,168,926), and further in view of Shibamoto et al. (US Pat. No. 6,563,212 B2).

Regarding claims 36-37, a further difference between the prior art and the claimed invention is a thermally conductive material made of a metal or metal alloy.

Shibamoto et al. teaches an adhesive (2) made of metal or metal alloy [col. 4, lines 25-39, and col. 8, lines 18-19].

Wachtler et al., Watson et al. and Shibamoto et al. are analogous art because they are from the same field of endeavor as applicant's invention. At the time of the invention it would have been obvious to a person of ordinary skill in the art to include an adhesive made of a metal or metal alloy. The motivation for doing so, as is taught by Shibamoto et al., is to reduce the thermal resistance between the chip and the heat spreader so that a high heat radiation characteristic can be obtained (col. 8, lines 18-24 and 31-32). Furthermore, the court has held that it is within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416 (CCPA 1960); *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). Therefore, it

would have been obvious to combine Shibamoto et al. with Wachtler et al. and Watson et al. to obtain the invention of claims 36-37.

Response to Arguments

8. Applicant's arguments with respect to claims 1, 3-4 and 34-37 have been considered but are moot in view of the new ground(s) of rejection.

Correspondence

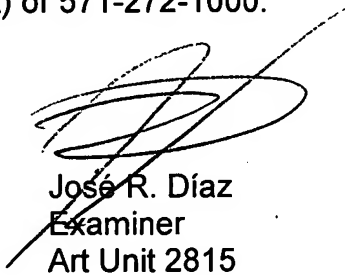
9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to José R. Díaz whose telephone number is (571) 272-1727. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kenneth Parker can be reached on (571) 272-2298. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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José R. Díaz
Examiner
Art Unit 2815